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09/975,985	10/15/2001	Kim B. Roberts	9-13528-152us	9596

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EXAMINER	
CURS, NATHAN M	
ART UNIT	**PAPER NUMBER**
2633	

DATE MAILED: 12/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/975,985	ROBERTS ET AL.	
	Examiner	**Art Unit**	
	Nathan Curs	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _15 October 2001_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-38_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-38_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _15 October 2001_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _7/3/02_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-9, 12-22, 24-30, and 32-38 are rejected under 35 U.S.C. 102(e) as being anticipated by Rao et al. (US Patent Application Publication No. 2004/0016874).

Regarding claim 1, Rao et al. disclose a method of measuring a polarization dependent effect (PDE) in an optical communications system including a plurality of optical components (fig. 1), the method comprising: receiving an optical signal at a selected detection point of the optical communications system (fig. 1, elements 18 and 20 and fig. 4 and paragraph 0053), the optical signal having been launched into the optical communications system with a predetermined initial polarization state (fig. 1, element 12 and fig. 2, and paragraphs 0034, 0049 and 0055); detecting a polarization state of the signal and evaluating the PDE using the predetermined initial polarization state (paragraph 0049, where every other bit having the same polarization state is a predetermined initial polarization state) and the detected polarization state (fig. 4 and paragraphs 0071 and 0073).

Regarding claim 2, Rao et al. disclose a method as claimed in claim 1, wherein the polarization dependent effect is either one of a polarization dependent gain and a polarization

dependent loss (paragraph 0071, where the signal fade disclosed is polarization dependent loss).

Regarding claim 3, Rao et al. disclose a method as claimed in claim 1, wherein the optical signal comprises any one of: a data signal; a test signal; and an Amplified Spontaneous Emission (ASE) signal (fig. 2 and paragraph 0041).

Regarding claim 4, Rao et al. disclose a method as claimed in claim 1, wherein the predetermined initial polarization state is substantially time-invariant (paragraph 0049).

Regarding claim 5, Rao et al. discloses a method as claimed in claim 4, wherein the predetermined initial polarization state comprises a degree of polarization of the optical signal launched into the optical transmission system (paragraph 0049, where the predetermined initial polarization state of two orthogonally polarized bit interleaved pulse trains comprises a degree of polarization).

Regarding claim 6, Rao et al. disclose a method as claimed in claim 5, wherein the step of detecting the polarization state of the signal comprises a step of detecting a degree of polarization of the optical signal at the detection point (paragraph 0071).

Regarding claim 7, Rao et al. disclose a method as claimed in claim 6, wherein the step of detecting the degree of polarization of the optical signal comprises steps of: splitting the optical signal into orthogonally polarized light beams (fig. 4, element 114 and paragraph 0064); detecting a respective power level of each of the orthogonally polarized light beams (paragraphs 0066 and 0067); and evaluating the degree of polarization from the detected power levels (paragraph 0071).

Regarding claim 8, Rao et al. disclose a method as claimed in claim 4, wherein the predetermined initial polarization state comprises respective known initial power levels of

orthogonally polarized signal components multiplexed into the optical signal (fig. 2, element 75 and 75', and paragraph 0049, where the transmitted power levels are inherently predetermined).

Regarding claim 9, Rao et al. disclose a method as claimed in claim 8, wherein the step of detecting the polarization state of the signal comprises a step of detecting respective power levels of each of the orthogonally polarized signal components (fig. 4, elements 124 and 126 and paragraphs 0064 and 0066).

Regarding claim 12, Rao et al. disclose a method as claimed in claim 1, wherein the predetermined initial polarization state comprises a predetermined variation of a polarization vector of the optical signal (fig. 2 and paragraphs 0041-0043, where each dither signal produces the predetermined variation).

Regarding claim 13, Rao et al. disclose a method as claimed in claim 12, wherein the predetermined variation of the polarization vector comprises a rotation of the polarization vector in accordance with a predetermined dither pattern (figs. 2, elements 96 and 98 and fig. 3 and paragraphs 0041-0043 and 0052, where dither modulating orthogonal polarization components will inherently rotate the polarization vector as represented on a Poincare sphere).

Regarding claim 14, Rao et al. disclose a method as claimed in claim 13, wherein the predetermined dither pattern comprises either one or both of: a step-wise rotation of the polarization vector between orthogonal directions; and a small-scale perturbation of a polarization angle of the polarization vector (figs. 2, elements 96 and 98 and fig. 3 and paragraphs 0041-0043 and 0052, where a cyclical dither signal modulating each orthogonal polarization component will inherently rotate the polarization vector between orthogonal direction and perturbate the angle of the polarization vector).

Regarding claim 15, Rao et al. disclose a method as claimed in claim 13, wherein the step of detecting the polarization state of the signal comprises a step of detecting a degree of

polarization of the optical signal as a function of time (paragraphs 0071 and 0073, where the DOP equation is based on frequency).

Regarding claim 16, Rao et al. disclose a method as claimed in claim 15, wherein the step of evaluating the PDE comprises a step of calculating a correlation between the predetermined dither pattern and the detected degree of polarization of the optical signal as a function of time (paragraphs 0071 and 0073, where the DOP equation – the DOP being used to indicate signal fade – correlates the predetermined dither frequency with the DOP).

Regarding claim 17, Rao et al. disclose a method as claimed in claim 12, wherein the predetermined variation of the polarization vector comprises variation of respective power levels of orthogonally polarized signal components multiplexed into the optical signal, in accordance with respective orthogonal dither patterns (fig. 2, elements 96 and 98 and paragraphs 0041-0043).

Regarding claim 18, Rao et al. disclose a method as claimed in claim 17, wherein the step of calculating the PDE comprises steps of: detecting a power level of each of the received light beams as a function of time (paragraph 0066, where the detected signals are time varying signal); calculating respective correlations between the respective predetermined dither pattern and the detected power levels; and evaluating the respective PDE as a ratio of the lesser of the calculated correlations to the sum of the calculated correlations (paragraph 0073, where the DOP equation – the DOP being used to indicate signal fade – correlates the predetermined dither frequency with the DOP).

Regarding claim 19, Rao et al. disclose a system for measuring a polarization dependent effect (PDE) in an optical communications system including a plurality of cascaded optical components (fig. 1), the system comprising: a transmitter adapted to launch an optical signal having a predetermined initial polarization state into the optical communications system (fig. 1,

element 12 and fig. 2 and paragraphs 0034, 0049 and 0055, where every other bit having the same polarization state is a predetermined initial polarization state); a polarization state detector adapted to detect a polarization state of the signal at a selected detection point (fig. 1, element 18) and a processor adapted to evaluate the PDE using the predetermined initial polarization state and the detected polarization state (fig. 4, element 100 and paragraphs 0071 and 0073, where there is inherently a processor required for calculating the results for the degree of polarization equation, using the detected power levels).

Regarding claim 20, Rao et al. disclose a system as claimed in claim 19, wherein the transmitter comprises a polarization rotator adapted to selectively rotate a polarization vector of the optical signal (figs. 2, elements 62 and fig. 3 and paragraphs 0041-0043 and 0052, where dither modulating orthogonal polarization components will inherently rotate the polarization vector as represented on a Poincare sphere).

Regarding claim 21, Rao et al. disclose a system as claimed in claim 19, wherein the transmitter comprises a controller adapted to selectively vary respective power levels of orthogonal signal components multiplexed into the optical signal, in accordance with respective orthogonal dither patterns (fig. 2, element 62 and paragraphs 0041-0043, where the modulators with dithered inputs are controllers with respect to controlling power levels of the orthogonal signal components).

Regarding claim 22, Rao et al. disclose a system as claimed in claim 19, wherein the detector comprises: a beam splitter adapted to split the optical signal into respective orthogonally polarized beams (fig. 4, element 114 and paragraph 0064); and means for detecting respective power levels of each of the orthogonally polarized beams (fig. 4, elements 124 and 126 and paragraphs 0066).

Regarding claim 24, Rao et al. disclose an apparatus for measuring a polarization dependent effect (PDE) in an optical communications system including a plurality of optical components (fig. 1), the network element comprising: a receiver adapted to receive an optical signal at a selected detection point of the optical communications system (fig. 1, elements 18 and 20 and fig. 4 and paragraph 0053), the optical signal having been launched into the optical communications system with a predetermined initial polarization state (fig. 1, element 12 and fig. 2 and paragraphs 0034, 0049 and 0055); a polarization state detector adapted to detect a polarization state of the signal (fig. 4, elements 124 and 128 and paragraph 0066); and a processor adapted to evaluate the PDE using the predetermined initial polarization state (paragraph 0049, where every other bit having the same polarization state is a predetermined initial polarization state) and the detected polarization state (fig. 4, element 100 and paragraphs 0071 and 0073), where there is inherently a processor required for calculating the results for the degree of polarization equation, using the detected power levels).

Regarding claim 25, Rao et al. disclose a network element as claimed in claim 24, wherein the polarization dependent effect is either one of a polarization dependent gain and a polarization dependent loss (paragraph 0071, where the signal fade is polarization dependent loss).

Regarding claim 26, Rao et al. disclose a network element as claimed in claim 24, wherein the optical signal comprises any one of: a data signal; a test signal; and an Amplified Spontaneous Emission (ASE) signal (fig. 2 and paragraph 0041).

Regarding claim 27, Rao et al. disclose a network element as claimed in claim 24, wherein the predetermined initial polarization state is substantially time-invariant (paragraph 0049).

Regarding claim 28, Rao et al. disclose a network element as claimed in claim 27, wherein the predetermined initial polarization state comprises a degree of polarization of the optical signal launched into the optical transmission system (paragraph 0049, where the predetermined initial polarization state of two orthogonally polarized bit interleaved pulse trains comprises a degree of polarization).

Regarding claim 29, Rao et al. disclose a network element as claimed in claim 28, wherein the detector comprises: a beam splitter adapted to split the optical signal into orthogonally polarized light beams (fig. 4, element 114 and paragraph 0064); respective optical detectors adapted to detect a respective power level of each of the orthogonally polarized light beams (fig. 4, elements 124 and 128 and paragraphs 0066 and 0067); and a comparator adapted to evaluate the degree of polarization from the detected power levels (fig. 4, element 100 and paragraph 0073, where a processor, or comparator, is inherently required for determining the results for the degree of polarization equation, using the detected power levels).

Regarding claim 30, Rao et al. disclose a network element as claimed in claim 27, wherein the predetermined initial polarization state comprises respective known initial power levels of orthogonally polarized signal components multiplexed into the optical signal (fig. 2, element 75 and 75', and paragraph 0049, where the transmitted power levels are inherently predetermined).

Regarding claim 32, Rao et al. disclose a network element as claimed in claim 24, wherein the predetermined initial polarization state comprises a predetermined variation of a polarization vector of the optical signal (fig. 2 and paragraphs 0041-0043, where each dither signal produces the predetermined variation).

Regarding claim 33, Rao et al. disclose a network element as claimed in claim 32, wherein the predetermined variation of the polarization vector comprises a rotation of the

polarization vector in accordance with a predetermined dither pattern (figs. 2, elements 96 and 98 and fig. 3 and paragraphs 0041-0043 and 0052, where dither modulating orthogonal polarization components will inherently rotate the polarization vector as represented on a Poincare sphere).

Regarding claim 34, Rao et al. disclose a network element as claimed in claim 33, wherein the predetermined dither pattern comprises either one or both of: a step-wise rotation of the polarization vector between orthogonal directions; and a small-scale perturbation of a polarization angle of the polarization vector (figs. 2, elements 96 and 98 and fig. 3 and paragraphs 0041-0043 and 0052, where a cyclical dither signal modulating each orthogonal polarization component will inherently rotate the polarization vector between orthogonal direction and perturbate the angle of the polarization vector).

Regarding claim 35, Rao et al. disclose a network element as claimed in claim 33, wherein the detector is adapted to detect a degree of polarization of the optical signal as a function of time (paragraphs 0071 and 0073, where the DOP equation is based on frequency).

Regarding claim 36, Rao et al. disclose a network element as claimed in claim 35, wherein the processor is adapted to calculate a correlation between the predetermined dither pattern and the detected degree of polarization of the optical signal as a function of time (fig. 4, element 100 and paragraphs 0071 and 0073, where the DOP equation – the DOP being used to indicate signal fade – correlates the predetermined dither frequency with the DOP).

Regarding claim 37, Rao et al. disclose a network element as claimed in claim 32, wherein the predetermined variation of the polarization vector comprises variation of respective power levels of orthogonally polarized signal components multiplexed into the optical signal, in accordance with respective orthogonal dither patterns (fig. 2, elements 96 and 98 and paragraphs 0041-0043).

Regarding claim 38, Rao et al. disclose a method as claimed in claim 37, wherein the processor comprises: a correlator adapted to calculate respective correlations between each of the predetermined orthogonal dither patterns and the detected power level and a calculator adapted to evaluate the PDE as a ratio of the lesser of the calculated correlations to the sum of the calculated correlations (paragraph 0073, where the DOP equation – the DOP being used to indicate signal fade – correlates the predetermined dither frequency with the DOP and where a processor, or correlator/calculator, is inherently required for determining the results for the degree of polarization equation, using the detected power levels and detected dither patterns of the orthogonal signal components).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 10, 11, 23 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rao et al. (US Patent Application Publication No. 2004/0016874) in view of Applicant's admitted prior art (specification, paragraphs 0036 and 0038).

Regarding claims 10, 23 and 31, Rao et al. disclose a method and system as claimed in claims 9, 19 and 30, respectively, wherein the detector and the step of detecting the respective power levels comprises step of: a de-multiplexer for de-multiplexing each of the orthogonally polarized signal components from the optical signal (paragraph 0064). Rao et al. also disclose means for measuring power levels of the detected demultiplexed signal components (paragraph

0066), but do not disclose means for measuring respective eye openings of each of the de-multiplexed signal components. However, the applicant discloses that de-multiplexing the signal components from the received signal and measuring the eye openings of each signal component are conventional (specification, paragraph 0038). It would have been obvious to one of ordinary skill in the art at the time of the invention that the eye openings of the demultiplexed signal components could be measured, since this is a conventional measurement technique, as disclosed by the Applicant.

Regarding claim 11, Rao et al. disclose a method as claimed in claim 1, disclose predetermined initial polarization states at the transmit side (paragraphs 0049 and 0055), detecting the orthogonally polarized signal components at the receiver (paragraph 0066), and evaluating the PDE (paragraphs 0071 and 0073), but do not disclose that the step of evaluating the PDE comprises a step of calculating a vector difference between the detected polarization state and the initial polarization state. However, the Applicant discloses that representing a polarization state as a vector quantity, based on the levels of the orthogonally polarized signal components, is conventional (specification, paragraph 0036). It would have been obvious to one of ordinary skill in the art at the time of the invention to represent the polarization state as a vector quantity in calculating the PDE of Rao et al., since this representation is conventional, as disclosed by the Applicant.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- US Patent No. 6483620 – discloses dithering the polarization state of light at a tranmitter, causing a rotation component for the orthogonal polarization signal

components as reprensented on a Poincare sphere (col. 3, lines 49-63 and col. 4, lines 17-56).

6. Any inquiry conceming this communication from the examiner should be directed to N. Curs whose telephone number is (571) 272-3028. The examiner can normally be reached M-F (from 9 AM to 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached at (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-2600.

M. R. Sedighian

M. R. SEDIGHIAN
PRIMARY EXAMINER